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ABSTRACT

The Sault Ste. Marie (Michigan) Area Public Schools' Compensatory Education Division undertook a 2-year process evaluation of the effectiveness of an early intervention strategy for low reading readiness kindergarten children enrolled in Title I programs. The first year of the evaluation sought to determine whether children exposed to this strategy performed better on the Stanford Early School Achievement Test (SESAT) than students receiving only the regular supplementary Title I services. Subjects, children identified at the end of kindergarten as high risk students, were randomly divided into three groups. During the fall semester, one group received the regular Title I services, while the remaining two groups received the special intervention strategy. During the spring semester, the regular Title I group was switched to the special intervention, one of the two special intervention groups continued with the program, and the third group received both the Title I services and the special intervention. Results showed no significant differences in the performance of the three groups at midpoint of the first year; however, second semester differences were significant. An apparent intervention effect occurred indicating superior achievement for students receiving the special intervention alone. The second year of the evaluation will investigate the effectiveness of both type of intervention and format of intervention upon SESAT performance. (FL)

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stepping stones...

an early intervention strategy for low reading readiness students

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by

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Compensatory Education

Sault Ste. Marie Area Public Schools
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Leo couldn't do anything right.
He couldn't read.
He couldn't write.
He couldn't draw.
And he never said a word.

"What's the matter with Leo?" asked Leo's father.
"Nothing," said Leo's mother.
"Leo is just a late bloomer."
"Better late than never," thought Leo's father.

Then one day, in his own good time, Leo bloomed!

He could read!
He could write!
He could draw!

He also spoke. And it wasn't
just a word, it was a whole
sentence.

And that sentence was . . .

"I made it!"

Kraus, Robert. Leo the late bloomer. New York: Simon and Schuster, 1971.

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S.R.M
February, 1983

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I. DELINEATION OF THE PROBLEM

AND

REVIEW OF LITERATURE

Introduction

Elementary school teachers, compensatory education reading specialists, and federal education program specialists are faced daily with the need to make complex instructional decisions. They are continually looking for answers to specific problems. Often they are engaged in attempts to find an instructional approach that will work for either a particular child or for a group of children who require some type of special treatment intervention in reading and/or mathematics.

The means educators use for solving their problems are varied. Most frequently they review the teacher's guides that accompany basal reading series, examine sets of supplementary materials, consult the curriculum guides developed by local curriculum ad hoc study committees, and discuss their concerns, problems, and/or challenges with co-workers. Occasionally they consult their supervisory and support staffs.

The one source of information most educators do not consult is the research literature. Perhaps the most probable explanation for this phenomenon is that educators feel that research activity is so far removed from the classroom and from compensatory education activities that it will not help them solve their immediate instructional problems. Many times educators will reply with such comments as "But that research does not apply to our children. That is outdated research. We are unique. Research and data can be manipulated." And yet, since the turn of the century, more research has been done on reading than on any other curricular area (Weaver, 1982).

Is the application of research to instructional practice important in the field of reading? Can the results of local quasi-experimental research, buttressed with national research studies, be used to improve teaching? Can the locally generated research and its subsequent findings be used for educational change, program development, and implementation? The author believes the answer to these questions is "yes"! His conviction concerning the issue served both as the genesis of this comprehensive interim report and as a source of motivation for the publication of the results and findings of this study.

For the past several years the Sault Ste. Marie Area Public Schools' primary elementary school staff has been involved in the study of a transition program for students between Kindergarten and first grade. Recommendations have been presented suggesting: (1) the formulation of a Kindergarten I and a Kindergarten II, (2) a separate grade and curriculum for transition grade, (3) a federally funded transition grade program, etc. The concerns are genuine for approximately ten percent of the annual Kindergarten class, as indicated by standardized testing and

teacher observations, do not appear to have acquired the basic reading readiness skills necessary to be successful in their early primary school years.

A review of Compensatory Education student files indicates that approximately fifty-six (56) percent of the total 1981-82 Title I population had been retained at least one year during their tenure in an elementary program. Furthermore, within this retention subpopulation, forty-three (43) percent had been enrolled in the district's regular transition program between Kindergarten and Grade One. Also of interest is that the transition group which serves as the focus of this study represents twelve percent of the 1981-82 first grade class of the Sault Ste. Marie (Michigan) Area Public Schools.

In the preparation of this report, the author conducted a literature review that focused upon documents initially appearing in several principal secondary sources that included: Psychological Abstracts, Educational Administration Abstracts, Current Index to Journals in Education, documents catalogued in the E.R.I.C. and E.R.S. systems, International Reading Association's library and publications, recent educational periodicals, research studies on compensatory education and early primary--reading readiness--school effectiveness, and specific articles and documents provided by the Michigan Department of Education, Michigan Department of Education State Library, National Institute of Education, and Educational Testing Service. The Review of Literature section describes and summarizes a comprehensive examination of relevant educational research material that was designed to identify the constellation of findings related to compensatory education and early primary/reading readiness programs.

Socioeconomic factors such as parental income or educational, family racial or ethnic background, and student preschool experience, despite their relationship to academic success, are variables about which educational administrators, program planners, and deliverers of compensatory education services can do little. The literature review described here has therefore placed primary emphasis upon those variables that are potentially manipulable by a school board, superintendent, program administrator, building principal, compensatory education deliverer of services, and/or parent group.

Two criteria were considered in selecting articles: (1) the research must have focused on variables that are potentially manipulable by a local school system, and (2) the research must be data-based. Therefore, empirical studies were reviewed while opinion-based or theoretical studies were not. Theoretical models describing the process of educational change without empirical data were judged to be too abstract to bear real relevance to the practical issues bearing upon the accomplishment of change in a reading readiness educational environment. Only when data were reported and a methodology described was a study considered to have acceptable quality, provided there were creditable findings.

The review also includes several articles that were themselves literature reviews of specific topics. Due to the typically large number of studies on which these reviews were based, they were given greater weight both in the process of selecting those variables that have a consistent, positive impact on student achievement in reading readiness and compensatory education at the primary level and in

identifying those variables which either have a negative impact or no impact upon student achievement.

Many of the findings and conclusions presented in the body of this paper may seem intuitively obvious and much like what common sense would suggest. It is important to remember, however, that what may appear obvious is not always supported by research.

It wasn't long ago that the major purpose and function of Kindergarten was to teach children social skills, such as taking turns and sharing. This half-day experience served also as a transition between the familiarity and warmth of days at home and the formality of first grade.

Cognitive skills were also developed. Children learned colors,shapes, numerals, and sometimes the alphabet; they learned about time,weather, and holidays; they learned new verbal skills through activities like "show-and-tell"; and they learned important concepts like relative dimensions of size, spacial orientation, and directionality. Thus, although some of the ground work for reading was laid, the important purpose of Kindergarten remained socialization.

Things certainly have changed! Kindergartens now are places of more formal and systematic prereading instruction. (Preparation for formal mathematics and other kinds of instruction also takes place in Kindergarten, but these curricular areas are beyond the scope of this discussion.) Cooperative nurseries, central day care centers, Operation Headstart, Native American Pre-School, and quasi-public preschool programs are the environments in Sault Ste. Marie, Michigan in which many children develop and are taught the skills that had formerly been emphasized in Kindergarten. Today most Kindergarten programs are rich

in language activities. Kindergarten children tell and are told stories. Letters and letter names become familiar, such as "Mr. T", "Mr. M", and "Miss O". Written words are used to label common objects in the classroom, and writing is often encouraged. It is through this repeated exposure to a variety of oral and written language activities that children are likely to develop a "linguistic awareness" or a knowledge of what reading is, i.e., knowing conventions of print such as reading from left to right, top to bottom, one line at a time; and knowing the concepts of a letter, word, sentence, or story. Development of this linguistic awareness is an important component of any reading readiness program.

Review of Literature

Language Experience Approach

It is not surprising that the most promising emphasis on learning to read has focused on comprehension. Comprehension is, after all, the essential condition of reading, for without an understanding of what is read, there is no reading. Only the most naive person would equate reading with the act of pronouncing words, a view manifested in the following statement that we have all heard, "This child reads well. It is just that he doesn't comprehend what he reads." Obviously, such a statement is absurd. Researchers of the reading process, from Thorndike (1917) to those of a more recent time (Farr, 1982), have demonstrated the futility of attempting to separate reading into the mechanics of pronouncing words and the comprehension of those words.

A historical review of the literature focusing upon reading comprehension emphasis that what is being learned about reading today is based

on the work of past researchers. Early studies attempted to view reading as a set of separate and distinct skills; attempts were made to determine the components of reading comprehension and to understand how a reader comprehends a single meaning from printed material. Building on those studies, current researchers and theorists have begun to truly understand reading comprehension as a much broader concept. Studies being conducted today focus on the logical process when one reads for it is recognized that the reading process depends simultaneously upon:

(1) building on the background of concepts,

(2) building on the background of experiences, and

(3) building on the background of language that the reader brings to the printed page.

In a sense, an author's ideas are seeded in a learner's background. As the learner attempts to explore his or her own ideas, to modify them, to fit new ideas into the organization of her or his thinking, and to construct new ideas, s/he is involved in a constant process of concept development.

Background Experiences, Language, and Concepts

Adams and Bruce (1982) describe the importance of background knowledge and the role of language in learning by stressing that new learning grows out of prior learning. A beginning reader's understanding depends on his or her conceptual knowledge, social knowledge, and story knowledge. If reading requires conceptual knowledge, then reading is reasoning. Further, the perception that reading is a reasoning process highlights that in the teaching of reading as a reasoning function we face at one and the same time both a barrier and a challenge. The barrier is that set by the child's limited comprehension of

what s/he reads. This barrier promises to stand in the way of a wide range of future learnings (Thorndike, 1974). The challenge is to overcome this barrier by better and more inventive teaching--not solely aimed at teaching children to read, but also to think. Given this orientation, it is hypothesized that as we improve the understanding with which a child reads, we may concurrently improve the effectiveness with which s/he processes a wide range of information important in his/her development. The challenge is also to learn to exploit for educational advantage the individuals' resources for reasoning through other media than words, so that the barrier of verbal limitation may be bypassed whenever it is not relevant (Thorndike, 1974).

We know today that good reading instruction practices are exemplified by the following:

1. Learning to read should involve children in experiences that they enjoy and that demonstrate that reading is a way to gain information, to solve problems, to encounter ideas, and to be entertained. This involves the teacher in identifying real reasons for children to read. Reading is therefore comprehension and the subsequent use of ideas.
2. The more closely skill-drill exercise is associated with a student's personal reasons for reading, the more likely such exercise is to develop readers.
3. An effective curriculum organization will provide the child with many types of reading opportunities and will be geared to the needs and the interests of individual children as much as possible. Thus good practice involves making available many types of reading material on many topics at a variety of

appropriate readability levels. It requires the teacher's learning as much as possible about each child's background, interests, needs, and abilities. This should be an ongoing assessment to determine appropriate tutorial (compensatory education) activities.

4. Materials used for instruction should be at a level of difficulty that allows the child to read fluently without assistance at his/her instructional reading level. No child should be forced to read material that is too difficult and that frustrates the child's attempt to comprehend.
5. Good instruction relies upon diagnosis from a variety of ongoing assessments, but, above all, it relies upon teacher observations.

Since previously cited research substantiates a language experience approach as an effective way to teach reading and related communication skills, it is this approach which is used as the beginning remedial reading stage in compensatory education's reading readiness developmental program. However, although the language experience approach is generally acknowledged as an excellent means of introducing (and in the case of compensatory education, reinforcing what has been introduced) children to reading, research on language experience programs for prereading instruction is relatively limited.

Socioeconomic Factors

One of the most replicable findings in reading research is that children from lower-class homes perform more poorly on measures of reading competence than do children from economically advantaged backgrounds. Such a result is obtained in studies of effects of variations

in educational opportunities (Armor, 1972; Coleman, Campbell, Hobson, McPhartland, Mood, Weinfeld, and York, 1966; Coleman, 1972; Jencks, Smith, Acland, Band, Cohen, Gintis, Heyns, and Michelson, 1972; St. John, 1970). It may also be seen in available records of the schools serving predominately low-income versus middle-and high-income children (Educational Commission of the States, 1972; Stein, 1971; Weber, 1973) as well as in studies which have focused on the longitudinal development of individual middle-and low-income children (Abelson, Zigler, and Deblaski, 1974). Studies of reading skills in countries other than the United States also generally report a positive relationship between socioeconomic status and reading readiness and ability (Thorndike, 1973; Venezky, 1970).

Brazziel and Terrell (1962) reported that the use of experience in a readiness program provided meaningful content for children of low socioeconomic background. Hall (1965) concluded that the language experience approach was superior to the basal approach for encouraging the reading readiness of children, when, after a semester of instruction in first grade, gains on the Metropolitan Reading Test were analyzed.

Horn, (1966) stated that new readiness programs are needed that stress language development, extension of experiences, and favorable self-concepts. Bond and Dykstra (1967) noted that there is some indication that low-readiness pupils perform better in a basal program, whereas high-readiness pupils are more successful with a language experience program. However, they suggested that sampling problems may have contributed to the appearance of this tendency.

Linguistic Awareness

There are some skills that seem to be very important for learning to read. These are often referred to as "linguistic awareness skills" and include: (A) developing sensitivity to relations between speech, language, and reading [Bruner, Jolly, and Sylva, 1976], (b) knowing what words and sentences are, (c) being able to manipulate phonemes in words and (d) understanding the conventions of printed language [Downing and Oliver, 1973]. A curriculum rich in language activities seems to foster development of these linguistic skills (Wallach and Wallach, 1976). Reading to children, allowing opportunities for writing, and playing word games, letter games, and so on, are important in a reading readiness program (Venezky, 1976).

While it appears to be the case that preschool children may not fully develop concepts of the linguistic terms used in an instructional setting, and they may not be able to indicate word-by-word matching of spoken/written words, nevertheless, they do have a functional concept of the purpose of reading, and writing. In addition, preschoolers have immature but developing concepts of linguistic terms and of print directionality, both on a page and in a book (Robeck and Wiseman, 1981).

Linguistic awareness--word/sentence recognition--has been of concern to educators since it is related to the failure of many children to learn to read. Gillet (1979) reported that Morris found that first graders' concepts of a word in print as a bound configuration were related to their phoneme segmentation ability and to success in beginning to read. According to Gillet (1979), Kita explored prereaders' concepts of the purposes for reading and writing and discovered that

children have a better grasp of the purposes for writing than of the purposes for reading, indicating that early writing experience eases children into beginning reading. In terms of cross-cultural research efforts, Temple (Gillet, 1979) related the strategies of young English beginning spellers to those of children speaking Spanish and found the same types of systematic misspellings, in spite of the regularity of Spanish phonology. This finding suggests that teachers should view children's invented spellings as positive attempts to represent speech rather than as errors.

Hansen (1969) hypothesizes that the main reason for the failure of many children to learn to read may be that reading programs often require the child to begin reading before s/he has developed oral language skills. Hansen further advocates that teachers should stress student involvement and utilization of the child's own sentence patterns, as a means for the teacher to direct the child's own discovery of transformations of more complex speech patterns.

Stanovich (1981) reported that phonological analysis skills are an integral component in early reading acquisition, while Hiebert (1981) examined patterns and interrelationships in the development of print awareness over preschool years. Hichert's results indicate that preschool children do not acquire such skills and concepts in a fixed order.

Basal Reader Program

O'Donnell and Raymond (1972) reported that children in a conceptual-language readiness program scored significantly higher gains in readiness than did children who use a basal readiness approach workbook. They reported that, while the readiness gains were significant for all

ability levels, the most pronounced difference in favor of the language experience approach was for the low-ability group. The experimental group scored significantly higher in visual discrimination and higher, but not significantly so, on letter names, but no difference was reported for the Wepman Auditory Discrimination Test.

Weber (1975) reported that children who participated in a language experience readiness program conducted by parents performed significantly better on a readiness test than did children who had been given phonics instruction by parents.

Letter Name Knowledge

Activities which teach letter names form part of the rich and varied language environment that seems to produce better readers (Chall, 1967). Young children are proud of their letter name knowledge, and researchers advocate that it is a good idea to provide Kindergartners with this sense of accomplishment (Downing and Thackray, 1975; Durkin, 1976; Dykstra, 1970, Jenkins, Bausell, Jenkins, 1972). Most important, however, the letter names should be taught during Kindergarten because letter name knowledge is necessary for communication between the teacher and the students during reading and language instruction in later primary grades (Johnson, 1970; Samuels, 1972; and Venezky, 1975).

Dermott, (1980) studied several reading readiness factors and concluded (1) that knowledge of alphabet letter names is the best predicator (a) of phonic skills other than vowel recognition and (b) of reading abilities involving words in insolation, and (2) that number knowledge is the best predicator of reading abilities involving words and syntax. Further, Chisholm and Gickling's (1978) efforts produced the same findings.

Visual Perception

Research does not support the contention that visual perception training which uses nonalphabetic shapes facilitates early reading. However, perceptual activities that involve letters and words are related to reading and writing and should be a part of a reading readiness program of instruction. Because most students master them early, these visual perception skills should not be a major emphasis of the early reading readiness program (Barrett, 1965; Doehring, 1968, Hammill, 1972; Hammill, Goodman, and Wiederholt, 1972; Robinson, 1972; Shankweiler and Liberman, 1972, Vernon, 1960; and Wiederholt and Hammill, 1971).

Auditory Perception

Certain auditory and phoneme-level skills are considered by many to be prerequisites to reading. While mastery of these skills is attained by some children through exposure to more general language activities, research results indicate that specific instruction is often helpful. In general, it appears that good readers are good at auditory perceptual activities, poor readers are not, and reading achievement in the primary grades can be improved by teaching these reading skills. Sound matching, phoneme segmentation, and other perceptual skills as part of their early school experience is recommended for most children (Cazden, 1976; Downing and Oliver, 1973; Hollingsworth 1969; Libermand and Shankweiler, 1982, and Rosner, 1974).

Visual and Auditory Discrimination

Visual and auditory capabilities, motor development, the presence of spatial concepts, vocabulary development, and social and emotional

status all appear to be factors in reading readiness development (Buttery, 1979). Lloyd's (1978) work supports a position that music can help children with reading readiness and beginning reading skills. It has been demonstrated that the incorporation of music coupled with an emphasis on phoneme identification skills will produce marked improvement with low-readiness first graders (Dorval, 1978).

Cullen (1978) suggests that no specialized auditory instruction is needed for children who come to school with adequate language background. However, Goldenberg (1978) suggests that for students from a low socioeconomic background, auditory discrimination activities should be blanded with visual discrimination, language development activities, and both fine and gross motor coordination. Hoover (1982) buttresses Goldenberg's research with the previously mentioned variables but also notes the need for reading readiness instruction which emphasizes vocabulary and language development coupled with teacher attention directed toward developing the child's interest in books, story sense and sequence.

Aural/listening skills appear to have an important contributing role in the development of reading readiness. Schwartz (1979) stresses the importance of competence in both receptive and expressive language, selective perception, and a rich experiential background for reading readiness, while Market (1974) emphasizes a strong need for auditory learning activities for those scoring low in reading readiness and/or in intelligence testings. Kreamer (1973) advocates a position which indicates that a listening comprehension test can be used in predicting first grade reading achievement. Balmuth's (1968) work in visual and auditory modalities suggest that while modality and perceptual skills

are very important as factors in early stages of reading instruction, cognitive abilities are more significant during the middle elementary years.

An overview of the research on visual discrimination shows a trend from the whole-word view to a combination of letter-discrimination and the whole-word method. Some implications for beginning reading instruction suggest:

1. that training in visual discrimination should begin with word and letter stimuli rather than with nonverbal graphic stimuli,
2. that the earliest visual discrimination exercise in Kindergarten should use letter stimuli, and
3. that visual discrimination training should include exercises in association sound and meaning with visual from (King and Muehl, 1967).

Finally, auditory modality research suggests that there is a developmental progression in perceptual abilities and that both auditory and visual perception are significantly correlated with student's reading achievement test scores. Further, although not reviewed extensively, mathematic readiness research supports, to a degree, a close interrelationship of number knowledge and reading abilities involving words and syntax (Dermott, 1980).

Mathematics Process

An interesting and extensive study by Hiebert and his associates (1980) investigates the relationships between Piagetian logical reasoning abilities and first-grade children's performance on verbal addition and subtraction problems. An analysis of simple arithmetic problems indicated that several reasoning abilities identified by Piaget are

needed to achieve operational understanding of addition and subtraction. The abilities studies were number conservations, class inclusion, and transitive inference.

The arithmetic problems used by Hiebert and his associates (1980) were varied systematically in semantic structure, number size, and the availability of objects to aid the solution process. Statistically significant differences between the developmental groups were found for some of the cognitive variables on some problem types. However, no clear pattern emerged to suggest that a particular cognitive ability was especially important for solving a specific problem type or for using a specific solution strategy. None of the cognitive abilities was absolutely required to solve any of the problem types or to use a given strategy. The report indicates that the use of these studies cognitive tasks as readiness variables for arithmetic instruction should be questioned. The study also suggests that mathematics problems solving ability may need to be reassessed for each instructional topic.

In summary, Peterson's Michigan Reading Association's presentation (1980) summarizes the efforts of twenty-five years of reading research with the following nine conclusions:

1. More formal methods appear to be superior to less formal methods in producing reading achievement.
2. Children may need an extended reading readiness period.
3. Only phonic generalizations with 75% utility should be taught.
4. Different skills exist in word identification and comprehension.
5. Better readers process larger number of distinguishable

reading comprehension skills.

6. There are a limited number of distinguishable reading comprehension skills.
7. Cognitive development is important in reading comprehension.
8. Higher level questions have the greatest effect on the best readers.
9. Socioeconomic factors have an important effect on reading comprehension.

Research Limitations

Except for these studies, language experience readiness programs generally have not be studied. The study of readiness in language experience programs reflects concern with test results and demonstrates little regard for specifics in terms of the nature of the programs or the characteristics of the students.

This quasi-experimental design will attempt to address student attributes/antecedents as well as the total reading achievement gain scores. Although discussions of readiness in reading methods, textbooks, and in instructional programs usually focus on a number of factors in children's attributes and/or antecedents (cognitive, physical, perceptual, linguistic, environmental, etc.), as well as on specific instructional areas (visual and auditory discrimination, left-to-right orientation, letter-name knowledge, for example), pre-reading language experience research, for the most part, is devoid of such specificity.

We do not know, for example, whether skilled reading is a holistic process of a set of interrelated subprocesses; researchers have not yet solved this problem. In this case, we do not think we can wait for

resolution. Instead, the author recommends that reading readiness be viewed as a set of subskills that can be taught and integrated. The author further hypothesizes that the development of subskills is important for learning to read and will prove useful to skilled readers when they encounter difficulty in a basal reader within a classroom.

II. PILOT STUDY DESIGN

Random assignment of subjects/students to the experimental and control groups is a most important feature of a pilot study design. Nevertheless, in educational research, particularly in field studies of compensatory education, random assignment of students to the experimental and control groups is sometimes not possible. Under such circumstances it is still possible to do an experiment having adequate internal and external validity. Such experiments have been termed "quasi-experimental" by Campbell and Stanley (1963) to indicate that neither the formation of a control group nor the random assignment of subjects has been done. Because of the restrictive nature of the subject population, and the mandatory federal rules and regulations for the operation of E.S.E.A., Title I (currently, E.C.I.A., Chapter I), of Compensatory Education, the author recognizes this pilot study research report to be based on a quasi-experimental design.

Since different students have different learning styles and aptitudes, a single instructional method or program may not be suitable for all students. Improvements in compensatory education may result from efforts to match instructional methods and programs to students who are best able to learn from them. Cronbach and Snow (1977) suggest that if compensatory education student populations are identified and separately evaluated on achievement measures, while extraneous delivery system variables are held constant, then alternative delivery systems can be

evaluated in terms of what has recently been called "aptitude by treatment interaction" research (Cronbach and Snow, 1963; 1977).

Thus, the methodology used by the author in this pilot study, proceeds under the assumption that the two factors--compensatory education intervention and learner characteristics--may interact with student performance in ways that have significance for compensatory education programming. Such a conceptualization falls within an aptitude by treatment research design; that is, assessing and evaluating the students' antecedents with the proposed treatment intervention (Farr, 1982). Borg and Gall (1979) state that this line of experimentation, although sometimes called "aptitude-treatment interaction (ATI) research", might be more appropriately called "attribute-treatment interaction" since the design process has been used to indicate that a wide range of learner characteristics--not just aptitude--may interact with instructional methods.

Following the work of Cronbach and his associates (1980,1982), the concept of process design/formative design has become important in secondary education. The present author was interested in designing a study that would allow him to evaluate the potential success of various treatment groups at alternative points throughout the academic year. Consequently, it was necessary to develop a design in which treatment groups were begun during one academic semester, evaluated at the end of the first academic semester, and then altered before the beginning of the second semester of the academic year.

Prior to the beginning of this study, the transition students in the Sault Ste. Marie Area Public Schools had only been exposed to a Title I intervention. It was the author's task to determine whether a

Title I intervention by itself was the most appropriate strategy to use with transition students. Towards this end he chose to investigate alternative interventions in order to compare the effectiveness of alternative interventions against the previous Title I intervention strategy.

Consequently, the formative experimental design was developed in two parts. For the first part, three experimental groups were constructed. These groups, presented in Figure 1, consisted of a Title I intervention alone and a second and third group in which a new intervention, the Phoenix condition, was employed. For each of the three treatment groups two school buildings were employed. The choice of buildings was randomly assigned such that each of the three conditions had two different buildings and no two groups had the same building represented in any condition.

FIGURE 1

STEPPING STONES EXPERIMENTAL DESIGN

First Semester		Second Semester
Regular Title I Intervention Alone	-----	Regular Title I Intervention Alone
Phoenix Alone	-----	Phoenix Alone
Phoenix Alone	------	Phoenix plus Regular Title I Intervention

Following the first academic semester, the original three treatment groups underwent revision. Given the limited number of subjects, it was not possible to formulate a completely crossed-design. Consequently, it was determined to investigate three second semester interventions which were in some sense independent but in a major sense dependent upon the treatment interventions which had occurred during the first academic semester. For the second semester, the three treatment interventions, as presented in Figure 1, were composed of Phoenix alone, Phoenix plus Title I, and Phoenix. Consequently, across the full academic year, three different full year treatment interventions, based on a process of formative design, were constructed. As can be seen in Figure 1, the first full-year intervention was composed of Phoenix the first term and Phoenix the second term. The second full-year intervention was composed of Phoenix the first term and Phoenix plus Title I the second term. In contrast, the third full-year intervention was composed of Title I first term and Phoenix the second term.

It was hypothesized that the Phoenix intervention, if provided across both academic semesters, would produce superior academic performance in transition students as compared to either of the other two full-year intervention conditions. Based on research data, it was hypothesized that the contributions of a single academic instructor with transition students would produce superior academic results when compared against treatment interventions in which a variety of faculty were used who worked wtihin the Title I program.

Given this process design, two independent variables are being examined. The first of these, type of intervention, concerns itself with the specific delivery of academic intervention. Due to the mixed

nature of this quasi-experimental design, the type of intervention and the number of interventions is confounded with the academic term in whcih the delivery is administered. While there are basically two interventions, the Title I intervention and the Phoenix intervention, there is simultaneously the issue of whether the intervention is delivered alone or whether it is delivered in combination with another intervention.

In the present study, during the first academic semester only a single intervention was employed. However, in the second academic semester one of the three groups received a dual intervention. Furthermore, as will be noted in Figure 1, one of the treatment groups received a constant intervention across both academic semesters while the remaining two groups experienced a change of intervention from one academic semester to the next. Consequently it is necessary to evaluate the academic data on a semester by semester basis. It is also helpful to look at potential overall growth of the students across the full academic year. In addition to the primary hypothesis, which investigates the potential superiority of the Phoenix group condition over the other treatment intervention, it is also possible to assess the preliminary findings concerning the impact of multiple as opposed to singular interventions upon the performance of transition students.

Given the complexity of the design, and the pilot study nature of the investigation, and the limited number of transition students available for data analysis, it appeared appropriate to do a one-way analysis of variance for semester one, a one-way analysis of variance for semester two, and a one-way analysis of variance for the full year using difference scores. In addition, a two-way analysis of variance

employing difference scores was done on the three groups across the two academic semesters.

Subjects

The twenty-three subjects who participated in the quasi-experimental design were those students who received a pre-test, a mid-year evaluation, and post-test. Of these twenty-three subjects, seven participated in Phoenix alone first semester followed by Phoenix alone second semester, eight subjects participated in Phoenix alone first semester followed by Phoenix plus Title I second semester, and eight subjects participated in Title I first semester followed by Phoenix second semester. Within each of the three treatment groups two buildings were represented. Across all treatments a single building served in only one treatment.

ATI research does not assume that one instructional method is better than another nor does it assume that students have certain characteristics are better learners than others. Instead, ATI research proceeds under the assumption that the two factors (method and learner characteristics) may interact in ways that have educational significance. Interactions are revealed by designing factorial experiments (Borg and Gall, 1979). Although detailed student population data are provided, the study concentrated on the variables of compensatory education interaction.

Thus, the presentor and author of this report perceived this pilot study to be a set of quasi-experimental designs using the ATI model. Both analyses of variance and correlational matrices were employed to test a hypothesis for the dependent measure, total reading achievement gain scores.

In the development of this intervention the Compensatory Education Divisional staff of the Sault Ste. Marie Area Public Schools was attempting to assess and determine the most effective delivery system financially feasible while still meeting the special needs of this subset of the district's compensatory education population. Although other combination interventions could have been introduced, the divisional staff directed its study towards a juxtapositioning of its current staff members to provide staffing for this independent variable.

A second and most important independent variable was also examined--duration of intervention. This independent variable was also manipulated at three levels: (1) first semester intervention, (2) second semester intervention, and (3) full year intervention.

In like manner as described for the first independent variable, the author and his staff were concerned and interested in the duration of the intervention. Would one year of the intervention be better than one semester either at the beginning of the year, or the second semester of the school year? Would the point of the introduction of this intervention have an impact on student achievement gain scores? What would be the results?

Because of the problems associated with a quasi-experimental design, the subjects were not randomly assigned to a treatment groups, nor were they assigned in equal numbers, to specific treatment conditions. However, all of the above mentioned levels of the independent variable are manipulable factors for a subsequent study. The consequence of this limitation is that the desired number of subjects presents a respectable researchable group and should be considered as a first year group of a two-year cross-sectional longitudinal study.

Once the data analysis for the above mentioned design was completed for the dependent measure of reading achievement gain, it was possible to do a posteriori correlational assessments to determine the degree and direction of relationships between measures.

For each segment of the experimental design within this study, it must be remembered that only a subset of the subjects participated. These nested experimental design considerations will be discussed in detail later in this report.

Assumptions

1. Normal Curve Equivalents (NCE's) can reliably measure gain scores of academic achievement in reading for compensatory education student populations.
2. Academic achievement for compensatory education populations can be measured by the Stanford Early School Achievement Test (SESAT).
3. The populations of low-achievers, potentially "high-risk" Kindergarten students, can be identified on a series of standardized tests before compensatory education intervention takes place.

Hypothesis

Reading Dependent Variable Hypothesis

Those students receiving the Special Title I intervention alone for the entire year will show superior performance relative to the other two groups on reading achievement gain scores.

Although other hypotheses could have been developed and explored, the author and his staff, after reviewing several alternative delivery system concepts, were in accord that this hypothesis should too be tested. If it was supported, then plans could be made to rearrange staffing assignments to implement this delivery in the district's total compensatory education program and thus reduce programmatic costs while providing a better delivery system to its special student population.

Scope and Limitations

The scope of this study can be assessed in terms of its contribution to an assessment of the effects of compensatory education early intervention on a group of culturally different low reading-readiness students in a rural, as opposed to an urban, setting. The author asserts there is a need for some preliminary, if admittedly unrefined assessments of the charge to which the two independent variables of interest account for variance in the dependent variable.

The present study explored the relationships between two intervention variables and total reading achievement gains. Among the goals of this study was a clearer identification of and the obtaining of data concerning the effectiveness of various Compensatory Education delivery systems in order to further improve the intervention programs for this select population of low-reading readiness post Kindergarten students. Finally, this study was designed to serve as a springboard for the development of more sophisticated research strategies which can subsequently evaluate the impact of program intervention with greater precision and tighter control.

This research study will have its greatest implication for a particular group--the compensatory education population of the Sault Ste. Marie (Michigan) Area Public Schools. The results of this study are less easily generalizable to other groups, in other areas, with different student population compositions. Among the restrictions of this present study which have to be considered with regard to its scope and limitations are the following:

(1) The limitations associated with the quasi-experimental design which does not allow for the actual random assignment of subjects/students to the various types of treatment interventions (delivery systems).

(2) The limitations associated with federal, state, and local regulatory limitations on the levels of treatment intervention to be provided to this special population of elementary grade school children.

(3) The limitations associated with mandated rules and regulations which require compensatory education intervention to each student eligible for it and restrict the provision of additional services for which the child is not eligible and the withdrawal or denial of services for which the child is eligible.

(4) The limitations associated with federal, state, and local regulatory restrictions which prohibit the use of compensatory education funds for providing services to, or testing of, non-eligible students. (This limitation restricted the author's ability to compare compensatory education student data against that of an appropriate control group.)

(5) The limitations associated with the size and restricted nature of the student compensatory education sub-population being evaluated in this present research. This restriction reduced the generalization of the present research results to other groups, even if the same variables were to be investigated.

(6) The limitations associated with the size of the population and the small number of subjects present in given cells of the

quasi-experimental design.

(7) The limitations associated with examining only the independent variables as herein defined. The independent variables of type of intervention and duration of intervention were examined only within a limited range and with specific instructional delivery systems, although it is recognized that (a) these independent variables may have been examined at several levels and (b) the specific delivery systems employed influenced student achievement.

(8) The limitations associated with the specific teacher characteristics, instructional materials, teaching methodologies, student group size, and other pedagodical considerations unique to this present study. These limitations restrict the generalizability of the findings and require cautious interpretation of the data.

(9) The limitations associated with the short-time span "pilot". This study could be enhanced by both follow-up cross-sectional and longitudinal work to see whether the long-range relationships which are obtained between these variables persist across time for given students and/or for given student populations.

PROCEDURE

General Population Compensatory Education

"Pilot Study" Student Subjects

Public and non-public school students are potentially eligible to receive compensatory education intervention services if they reside in and attend eligible E.S.E.A., Title I, "target schools". The criteria for admittance into compensatory education are based on several federal regulatory provisions. Among these provisions is the mandatory requirement that the neighborhood elementary school have a poverty factor above the school district's poverty index. In Sault Ste. Marie, Michigan, all of the district's seven public elementary schools met this federal requirement and were, therefore, determined Title I "target schools". Thus, all seven elementary schools were eligible to receive federal compensatory education monies and programs in the 1981-82 school year. (Although there are private elementary schools within the public school district, their individual policy boards opted not to participate in any federal education program).

Upon a Kindergarten child's referral to the Compensatory Education Division of the Sault Ste. Marie Area Public Schools, the Compensatory Education staff perused each child's cumulative school record, reviewing (1) standardized test scores, (2) classroom daily work, (3) text- and work-book assignments, (4) "end-of-the-unit-tests", and (5) other

informal student academic productions. In addition, an in-depth conference was held between the Compensatory Education teacher and the child's Kindergarten classroom teacher to review and discuss in detail the child's classroom performance on language-experience-related activities. The child was then given the appropriate level of the Stanford Early School Achievement Test (Psychological Corporation, Harcourt, Brace, Jonovich, 1969) as a pretest.

Table 1 represents the number and percentage of participating Title I transition students in the pilot program by attending schools.

TABLE 1

NUMBER AND PERCENTAGE OF PARTICIPATING TITLE I "PILOT STUDY" STUDENTS BY ATTENDING SCHOOLS

Title I "Target School"	Participating in Study	Percent
Bruce Twp. Elementary	1	3
Finlayson Elementary	3	10
Jefferson Elementary	5	17
Lincoln Elementary	6	21
McKinley Elementary	4	14
Soo Twp. Elementary	6	21
Washington Elementary	4	14
TOTAL	29	100%

Following the determination that the student/subject was eligible for compensatory education services, the student/subject was assigned to Compensatory Education's special transition "pilot program".

Under federal rules and regulations the compensatory education service that the child receives under Title I of the Elementary and Secondary Education Act must be a supplement to the child's regular classroom program. Federal rules and regulations prohibit the supplanting of local educational agency basic instructional obligations--regardless of academic deficiency (ies).

In accordance with federal reporting requirements of annual achievement data, the research was restricted to a population of compensatory education students who had: (1) been given both the pretest and posttest, (2) attended school for at least 150 days between pretest and posttest sessions, and (3) were between the ages of 5 and 6.

Sources of Data

The population of subjects for the quasi-experimental design were all identified low-reading readiness students enrolled and serviced in the E.S.E.A., Title I program of the Sault Ste. Marie Area Public Schools, attending one of the seven elementary public schools, during the 1981-1982 school year (September 15, 1981, through June 5, 1982). Each child was enrolled in a transition experience after having completed Kindergarten. The transition grade occurs as an alternate to first grade, for those children who have been judged to benefit from an additional year of educational experience prior to entering first grade. Such children range in age from 5 to 6.

Table 2 indicates the total student/subject population for the "pilot study" by gender and ethnic background.

TABLE 2

GENDER AND ETHNIC BACKGROUND

Building	Gender		Ethnic Background	
	Male	Female	Caucasian	Native American
Bruce Twp.	0	1	1	0
Finlayson	3	0	0	3
Jefferson	2	3	3	2
Lincoln	5	1	4	2
McKinley	3	1	2	2
Soo Twp.	4	2	5	1
Washington	2	2	2	2
TOTAL	19	10	17	12
PERCENTAGE	66%	34%	59%	41%
	100%		100%	

Native American students/subjects are defined as those persons: (a) having origins in any of the original peoples of North America, and (b) who maintain cultural identification through tribal affiliation, and (c) who have community recognition, and (d) who have signed United States Department of Education/Office of Indian Education USED: OIE #584

self-declaration affidavits that have been verified by (1) the Sault Ste. Marie Tribe of Chippewa Indians and (2) The Office of Indian Education, Sault Ste. Marie Area Public Schools.

In Sault Ste. Marie, Michigan's Public Schools (1981-1982), with an enrollment of 3,800 students, grades K-12, approximately 21 percent of its total school population was Native American. This 21 percent approximation projected out to approximately 798 Native American students enrolled in the district's schools.

A review of tribal affiliations of the public school enrolled Native Americans indicates that a majority of the Native American students (90 percent) are affiliated with the Sault Ste. Marie Tribe of Chippewa Indians (the newest and largest federally recognized tribe East of the Mississippi River). Other tribal affiliations include Seneca, Ottawa, and Iroquois affiliation. The Sault Ste. Marie Area Public Schools has the largest enrollment of non-reservation-based Native Americans in the State of Michigan and the entire United States (Department of Education, Office of Indian Education, 1979), while Chippewa County (of which the Sault Ste. Marie Area Public Schools is the largest public school district) has the largest concentration of Native Americans in the State of Michigan (Michigan Department of Education, 1973). Because the Sault Ste. Marie Tribe of Chippewa Indians does not have a reservation-based community for its membership, members of the Tribe reside in all areas of the community of Sault Ste. Marie, Michigan (see Table 3 for distribution of Native American students in study).

For the purpose of this study, Caucasian has been defined as not being of Latino or Hispanic origin, but having origins in any of the original peoples of Europe, North Africa, or the Middle East. In the

process of determining "Caucasian" as a condition, the child's parent/guardian was required to sign an Ethnic Identity Card for Michigan Bilingual Education Services of Compensatory Education, Sault Ste. Marie Area Public Schools, and this signed card was used for verification.

Socioeconomic Characteristics

The socioeconomic characteristics of students/subjects for this quasi-experimental design are presented in Table 3. Table 3 indicates that approximately 72 percent of the students in the "pilot study" were below the national poverty level threshold, while only approximately 28 percent of the students were above the 1981 national poverty level threshold for non-farm family.

TABLE 3

NUMBER AND PERCENTAGE OF STUDENTS
ABOVE AND BELOW THE NATIONAL POVERTY LEVEL

Poverty Threshold	Number	Percent
Above Poverty Level	8	28%
Below Poverty Level	21	72
TOTAL	29	100%

With respect to the two socioeconomic strata (above and below the national poverty level threshold), the author used the United States Department of Labor nonfarm family poverty threshold guidelines as well as the guidelines from the United States Department of Agriculture's "Income Poverty Guidelines" for eligibility for federally subsidized student school meals to determine the level of poverty. (Additional information

and verification of poverty was obtained through the cooperation of the Chippewa County Department of Social Services, an agency which validated which children were from families who were receiving public assistance.

One out of every ten people living in Sault Ste. Marie, Michigan, was on Aid to Families with Dependent Children (AFDC or ADC) on January 2, 1982. (Chippewa County Department of Social Services, 1982), the mid-point of this study. And of that number, 37 percent had children attending the Sault Ste. Marie Area Public Schools!

Preschool Characteristics

Within the subject/student population (N-29), the author was able to determine whether or not the student/subject had a pre-school experience prior to entering the compensatory education program, especially this "pilot study." Preschool, in its broadest term and herein used, is described as any full- or part-day program for preschool-age-youngsters, and may include such local programs as Operation Head-Start, Cooperative Nursery School, Sault Ste. Marie Tribe of Chippewa Indians Johnson O'Malley Preschool, Central Child Care Center, etc. The distribution of this special Title I subpopulation, based upon whether or not the student/subject had a pre-school experience, is shown in Table 4. Approximately 93 percent of the students in the pilot study had no preschool experience!

TABLE 4

NUMBER AND PERCENTAGE OF STUDENTS
WITH/WITHOUT PRE-SCHOOL EXPERIENCE

Type of Student	Number	Percent
Preschool Experience	2	7%
No Preschool Experience	27	93%
TOTAL	29	100%

During the course of this "pilot study", the Sault Ste. Marie Area Public Schools enrolled approximately 252 students in Kindergarten. Studies conducted by the author's staff and by those staff members of the Sault Ste. Marie Area Public Schools Community Schools Division, indicated that approximately 89 (N=224) percent of the student population entering Kindergarten each year had had at least a one-year preschool experience. These pre-school experiences have usually been provided by the Chippewa-Luce-Mackinac Counties Human Development Agency (Community Action Agency) through its Operation Head Start program or the Sault Ste. Marie Tribe of Chippewa Indians' Pre-School Program, as well as the other organizations previously mentioned.

Table 5 indicates the number and percentage of students in the present study with no preschool experience by gender.

TABLE 5

NUMBER AND PERCENTAGE OF STUDENTS
WITH NO PRESCHOOL EXPERIENCE BY GENDER

Gender	Number	Percent
Male	17	63%
Female	10	37%
TOTAL	27	100%

Table 6 indicates the number of children and percentage of children in the present study with no preschool experience by ethnic background, while Table 7 indicates the number of percentage of children in the present study with no preschool experience by socioeconomic status.

TABLE 6

NUMBER AND PERCENTAGE OF STUDENTS
WITH NO PRESCHOOL EXPERIENCE BY ETHNIC BACKGROUND

Ethnic Background	Number	Percent
Caucasian	15	56
Native American	12	44
TOTAL	27	100%

TABLE 7

NUMBER AND PERCENTAGE OF STUDENTS
WITH NO PRESCHOOL EXPERIENCE BY SOCIOECONOMIC STATUS

Socioeconomic Status	Number	Percent
Above Poverty	7	26
Below Poverty	20	74
TOTAL	27	100%

Dependent Variable--Reading

In the preceding section the author has discussed the organismic population characteristics for this quasi-experimental "pilot study": (1) ethnic background--Native American or Caucasian, (2) socioeconomic status--above or below the national poverty level threshold, and (3) preschool experience--the presence of or absence of the experience. In the following section, the author will discuss the selection and the measurement of the dependent variable, reading, as it was assessed in terms of total student reading gain scores.

The American public expects that, after six years of instruction, a child should be able to read with fluency and understanding. Most students meet this expectation reasonably well. Other students are less successful. The benefits of education, as indicated by skilled reading achievement, are not equally distributed over all sectors of our society. In particular, educational attainment is strongly correlated with family socioeconomic status (Grant and Lind, 1975). The exact causal links may elude researchers, but the general sense is that poverty and low academic achievement are intertwined in a continuous link which has proven resistant to intervention.

Title I (currently Chapter I of the Education, Consolidation and Improvement Act of 1981, E.C.I.A.) of the Elementary and Secondary Education Act of 1965 and its subsequent amendments, sought to break this vicious circle by the establishment of compensatory education programs for disadvantaged students. Numerous surveys have aimed to assess the effectiveness of these federal efforts, with generally mixed and uncertain results (Rand, 1978). The data are fragmented and though one can find

exemplary evaluations, the nationwide effects of this Act remain indeterminate.

Unfortunately, it is not easy to isolate Title I (Chapter I) compensatory education reading and mathematics programs from other efforts to augment reading and mathematics instruction for students in need.However, the Elementary and Secondary Education Act of 1965, and its subsequent amendments, mandate that the federal compensatory education funds be used to provide special services in reading and mathematics for low-achieving students and to "contribute to the cognitive, emotional, social, or physical development of participating students" (NIE, 1977, p. 14).

The actual implementation of "special services" varies by state and by local public school district. In Michigan, the State Board of Education mandates that the efforts be directed first towards reading improvement, followed by mathematics, and then "special services" to contribute to the emotional, social, or physical development of participating eligible students. Clearly, in Michigan, primary attention is placed upon reading competence. Thus, the independent variables to be addressed in this study are those related to the type and duration of compensatory reading intervention and the dependent measure is an assessment of total student reading achievement gains.

In the measurement of the dependent variable of total reading achievement gain, the "pilot study" used Normal Curve Equivalents (NCE's), a normalized, standard-score scale for reporting achievement data referenced to the national population at each grade level. The scale has a standard deviation of 21.06. It ranges from 1 to 99 with a midpoint of 50 and matches the percentile scale at those three points--1, 50, and 99. NCE's are also related to stanines--a score difference of one stanine is

approximately eleven NCE's. Within this framework, the criterion, the student's achievement gain, is defined as the number of Normal Curve Equivalents (NCE's) gained over the course of the "pilot study." NCE's are a type of relative score, based on a federally mandated assumption that without Title I, students would, on the average, maintain their relative position within the student distribution of reading gain scores. Hence, the logic on which the system was based is that, without Title I, the average gain in NCE's between pretest and posttest would be zero. Thus any increase in NCE's should reflect an upward change in the relative position of a student or group of students that is attributable to an effect of the Title I program intervention.

MEASUREMENT INFORMATION

The appropriate pretest (Level I) and posttest (Level II) of the Stanford Early School Achievement Test was administered to each of the participating students in this study during the recommended testing norm periods of time.

Intervention Dimensions

This subsection presents a listing and explanation of the instructional intervention dimensions of the study because factors relating to successful reading readiness programs may differ. This section will also provide a listing and explanation of the various factors which impact upon the delivery of the total set of compensatory education interventions as well as those which are unique to the pilot study.

Instructional Salary Factors

Expenditures for the pilot study instructional salary were based on the Master Agreement between the Sault Ste. Marie Area Public Schools' Board of Education and the Sault Education Association. No extra-duty contracts, compensatory time payments, etc., were present. The teacher's salary was based on the number of service years to the Sault Marie Area Public Schools and the level of degree held.

Expenditures for In-service and/or Staff Development

In accordance with locally developed practice, the total staff was provided with the same amount of time and programming of in-service staff development.

Test Interval

For the purpose of this experimental study, all pilot study students were given the appropriate level of the Stanford Early School Achievement Test (SESAT), Psychological Corporation/Harcourt, Brace, Jovanovich, 1969 and 1976 edition, as a pre-test (SESAT I). This instrument had been administered to these students at the end of their kindergarten year--May, 1981. (Two students were new to the district in September, 1981, and during the first week of October a SESAT I was administered to them.)

Mid-point testing, in like manner, consisted of the appropriate SESAT test (SESAT I). Mid-point testing occurred during the third week of January, 1982.

Posttesting, using the same instrument and level when appropriate was given to the pilot group. However, because of the ages, of the students at the time of posttest, many were given the SESAT II during a two-week interval in May, 1972. All students measured received one hundred and

fifty days (150) days of instruction between pre and post testing within this study.

Absence of Volunteers in Interventions

During no time during the pilot study were volunteers present. However, parents were encouraged to attend in-service sessions and frequent contacts with the parents and the home were maintained by the Compensatory Education teacher.

Location of Title I Interventions

In each of the elementary schools,separate areas were provided for this study--outside the regular classroom.

Staff Planning Time

A minimum of six hours, maximum of eight hours, a week of staff planning time was allocated.

Teacher's Involvement in the Selection of Materials

The teacher selected the materials to be used in this pilot study. Many of the learning resources were teacher-made. The Compensatory Education librarian assisted in the location of materials for the pilot study delivery.

Locally Developed Management Plan.

The pilot study teacher developed and maintained the management plan for activities, scheduling, etc.

Articulation with Classroom Teacher

Academic, motor, auditory, and visual skills checklists and materials were all reviewed and discussed with each of the regular classroom teachers of the subject population. Much interchange occurred with the sharing of ideas, materials, and other resources. The guidelines

for the Title I pilot program were the same as for the regular Title I program in that no new content material was introduced to the students. Curricula introduced by the regular transition classroom teacher were reinforced.

Subject Introduction to Pilot.

The students were introduced to the study on October 21, 1981.

Variability in Measurement

A pupil's score on any part of a test should not be thought of as an exact determination of his/her level of achievement but as an approximation of this level.

In any test situation some pupils are likely to guess occasionally; the attention of some may wander due to distractions; some children may not be feeling well physically; and many others may be affected by extraneous factors which may influence a test score. This is especially true at Kindergarten and Grade 1 levels. Such factors may change a child's test score, but usually not by more than one stanine and/or NCE. For this reason, it is advisable to consider a pupil's "true score" to be the stanine he/she obtains, plus or minus one stanine or eleven NCE's. Test results should not be over-interpreted individually; stanines and NCE's should be thought of as falling within a range or band of plus or minus one stanine or eleven NCE's.

Data Analysis

Test Score Conversion Procedures. The step-by-step procedure for converting individual student raw dependent measure scores to Normal Curve Equivalents (NCE's) is identical for most of the nationally norm-referenced achievement tests commonly used in E.S.E.A., Title I, evaluations throughout the country.

Student Test Scores. Each student's/subject's pretest and posttest raw scores are then converted to a common scale, or standard score, with instruments provided by Psychological Corporation for the Standard Early School Achievement Test, Level I and II, 1969 and 1976 editions. Using the appropriate table, each pretest and posttest score is converted to a corresponding standard score.

NCE's (Normal Curve Equivalents) Computation. The standard scores recorded for each student/subject are then converted to percentiles, using the tables that are provided by Psychological Corporation for the 1969 and 1976 Stanford Early School Achievement Test, Level I and II. In this way the individual student's pretest and posttest standard scores are converted to percentiles.

Using the Percentile Rank to Normal Curve Equivalents (NCE's) Table provided by the Psychological Corporation for the SESAT series, all percentiles are converted to NCE's. Finally, computing the NCE gain is completed by subtracting the pretest NCE from the Posttest NCE. If the result is less than zero, a minus (-) is recorded.

The criterion, student achievement gain, is computed by subtracting the student pretest achievement level in NCE's from the student posttest achievement level in NCE's. For example, if an individual student's

recorded pretest level was twenty-five (25) NCE's and the posttest level was thirty-five (35) NCE's, the student's achievement gain would be thirty-five NCE's minus twenty-five NCE's or an individual student achievement gain of ten (10) NCE's (35 NCE's - 25 NCE's = + 10 NCE's).

Rationale for the SESAT I and II (Selections of test instrucment)

The Stanford Early School Achievement Test is designed to provide a measure of a child's cognitive abilities at various levels. The period from Kingergarten through first grade is considered to be one of the most important developmental periods in a child's life.

Although SESAT I and II do not assume a prescribed Kindergarten program they do take into consideration new Kindergarten trends toward greater attention to mental growth. Most knowledge at this age is learned as a result of rather direct adult intervention. The SESAT series (Level I and II) is not intended to be a "readiness test," except in the same sense that an achievement test at Grade I is a readiness test for grade 2, etc. to the nearest whole number. In the process of converting standard score to percentile, care is taken to guarantee appropriate assigned grade level at the time of the pretest and posttest.

Data Gathering

The process of data gathering was achieved through the use of the Stanford Early School Achievement Test, Level I, 1969 Edition, and Level II, 1976 Edition, and its appropriate subtests--The Environment, Mathematics, Letters and Sounds, Aural Comprehension, (Psychological Corporation, Harcourt, Brace, Jovanovich, Inc.), with all test scores reported in Normal Curve Equivalents (NCE's). Since federal rules and regulations require the listing of the complete dependent variable achievement measurement instrument to avoid confusion among tests with similar names,

the above information has been provided. Similarly, federal rules and regulations require the reporting of both the Test Form and Level(s) administered to students/subjects, and the dates (month/days/year) on which these students were given the E.S.E.A. Title I evaluation pretest and posttest. In addition to the above requirements, the State of Michigan's Department of Education also requires that the test instruments be approved by the Michigan Department of Education. All of these mandates are met through the use of the Stanford Early School Achievement Test (SESAT). Figure 2 presents the data gathering process used to measure the dependent variable student achievement gain process for the pilot study.

Figure 2

DEPENDENT MEASURES ACHIEVEMENT GAIN PROCESS

[1] Stanford Early School Achievement Test (Level I)	[2] Dependent Measure of Reading	[3] Title I Pilot Study Population (N = 24)
[4] Date of Pretest May, Spring 1981 (N=27) Sept., Fall 1982 (M=2)	[5] Date of Interim Mid-point Test: Jan 20-25, 1982	[6] Date of Posttest SESAT, (Level II) May 17-21, 1982
[7] Project Setting Code for all Students	[8] Pretest Score Per Cell of Pilot Study Experimental Design	[9] Posttest Score Per Cell of Pilot Study Experimental Design
[10] Average NCE Gain Scores Per Cell of Pilot Study Experimental Design	[11] Data Analysis	

Although not included in the reporting requirements for the Michigan Department of Education, the author also elected to have several a posteriori tests conducted as they relate to the basic parts of the SESAT I and II.

A Table 8 indicates, not all of the parts of SESAT II are included in SESAT I.

Table 8
COMPOSITION OF SESAT TEST PARTS:
SESAT I AND SESAT II

Part	SESAT I	SESAT II
The Environment	X	X
Mathematics	X	X
Letters and Sounds	X	X
Aural Comprehension	X	X
Word Reading		X
Sentence Reading		X

X = Included in test

Briefly, these parts included the following:

Composition of the test instrument

Part 1. The Environment. The Environment items of SESAT are taken almost equally from the social and the natural environments, social sciences, and natural sciences. Knowledge of the environment is absorbed by children from many sources, including parents, brothers, sisters, neighbors, trips, television, books, and contact with things. Through voluminous inner speech and overt talk, children organize a mental life that is well advanced upon entrance to and participation in early school years. It is generally accepted by educators that general information has been one of the best forecasters of success in schools. This particular subtest set of items is designed to foretell interest in these

environmental areas, and performance on the subtest is also correlated with success in learning to read.

Part 2: Mathematics. Primary school education mathematics consists of concepts in the following areas: conservation of number, space, and volume; counting; measurement; numeration, classification, simple operations, and occasionally algorithms. Although this report does not address it extensively within the pilot study, the general philosophy of mathematics education upon which the choice of items is based within the sub-test, is that much conceptual teaching should precede computation and even counting. SESAT II measures some content of a more formal program in mathematics concepts: counting, facts of addition and subtraction using numbers 1 through 9, and problem solving.

Part 3: Letters and Sounds. This sub-section of the SESAT I and II tests measures both the ability to recognize upper and lower-case letters and the auditory perception of beginning sounds. According to the authors of the tests, these abilities are the best single predictors of success in learning to read. (The reasons for this may be that [1] pupils who have acquired the knowledge on their own have a propensity for reading, or [2] those who have been taught at home have a potential source of assistance that continues to serve them after they enter school). There need be no direct instruction before entering school, but opportunity for contact with letter identification and related sounds improves one's score significantly. Inadequate learning following instruction signals the need for analysis and possible early compensatory education intervention.

Part 4: Aural Comprehension. Under this section is the requirement that students be able to pay attention to, organize, interpret, infer, and retain what has been heard. However, this subtest of items is not merely

a "spoken reading comprehension test"; it involves a carefully chosen set of experiences that range from mere recall to adaptations of aspects of logic.

Part 5: Word Reading. Present only in the SESAT II, the word reading subtest deals with syntax, the meaning of individual words in various contexts, the ability to recognize individual words, and a wide variety of morphemes other than the the base words. It is understood, of course, that young children have greater competence in understanding language than in performing in standard language. This test requires a very limited portion of language skills and the meaning load in early word recognition is also quite limited.

Part 6: Sentence Reading: This subtest requires the basic ability of word reading, letters and sounds.

Together, these subtests present a composite total reading score which was used in the development and measurement of the total reading achievement gain score used as the dependent measure of this pilot study.

Analysis of Variance.

As mentioned earlier in this report, the author employed an evaluation model which required an analysis of variance, ANOVA, for unweighted means (Winer, 1962). Two independent variables, type of intervention and duration of intervention, were manipulated in this quasi-experimental investigation. Total reading NCE achievement gain scores served as the dependent measure. However, since not all possible treatment combinations were employed, the data analysis is restricted to interpretations which rely upon correlational findings and partial comparisons of appropriate treatment conditions.

Table 9 was used for the analysis of different scores for the dependent variable of total reading, and Table 10 was used for the analysis of absolute scores for the dependent variable of reading. Students who experienced one of the three independent variables were evaluated in terms of total reading NCE achievement gains scores (stated hypothesis).

Table 9 and Table 10 thus allows for the presentation of all individual (and mean) scores within each of the cells of the design, and therefore the data can be represented in individual cubicles as a factorial design.

Independent Variable Population Antecedents. In the following tables (Tables 11, 12, 13, and Table 14) the author has presented a demographic breakout of the population antecedents of the students/subjects with the intent of providing the reader with additional background of the population served during the quasi-experimental pilot study.

Table 9

ANALYSIS OF VARIANCE DESIGN FOR
DIFFERENCE READING GAIN
SCORES (N = 23)

Independent Variable	Period of Intervention	
	First Semester	Second Semester
C/C N = 7 Phoenix		
C/TIC N = 8 Phoenix/Phoenix plus Title I		
TI/C N = 8 Title I/Phoenix		

Table 10

ANALYSIS OF VARIANCE DESIGN FOR
ABSOLUTE NCE READING GAIN
SCORES (N = 23)

Independent Variable	Period of Intervention		
	Spring '81	January '82	June '82
C/C N = 7 Phoenix/Phoenix			
C/TIC N = 8 Phoenix/Phoenix plus Title I			
TI/C N = 8 TitleI/Phoenix			

Table 11

POPULATION ANTECENDENTS OF "TITLE I ALONE" GROUP FOR FIRST SEMESTER

	McKinley School N = 4	Washington N = 4
Ethnic Background		
Caucasian	2	2
Native American	2	2
Gender		
Male	3	2
Female	1	2
Socioeconomic Status		
Above Poverty Level	0	1
Below Poverty Level	4	3
Preschool Experience		
A Preschool Experience	0	0
No Preschool Experience	4	4

Table 12

POPULATION ANTECEDENTS FOR "SPECIAL ALONE" GROUP--PHOENIX--FOR FIRST SEMESTER

Site/ Building	Number of Subjects	Finlay-son N=3	Jeffer-son N=5	Lin-coln N=6	Soo N=6	Total N-20
Ethnic Background						
Caucasian		0	3	4	5	12
Native American		3	2	2	1	8
Gender						
Male		3	2	5	4	14
Female		0	3	1	2	6
Socioeconomic Status						
Above Poverty Level		0	1	1	4	6
Below Poverty Level		3	4	5	2	14
Preschool Experience						
A Preschool Experience		1	0	1	0	2
No Preschool Experience		2	5	5	6	18

Table 13

POPULATION ANTECEDENTS FOR "TITLE I AND SPECIAL" GROUP--TITLE I PLUS PHOENIX--FOR SECOND GRADE

Building/Site	Lincoln School	Soo Twp.	Total
Number of Subjects	N=6	N=6	N=12
Ethnic Background			
Caucasian	4	5	9
Native American	2	1	3
Gender			
Male	5	4	9
Female	1	2	3
Socioeconomic Status			
Above Poverty Level	1	4	5
Below Poverty Level	5	2	7
Preschool Experience			
A Preschool Experience	1	0	1
No Preschool Experience	5	6	11

Table 14

POPULATION ANTECEDENTS FOR "SPECIAL ALONE"--PHOENIX--FOR SECOND SEMESTER

Building/Site	Bru	Fin	Jeff	McK	Wash	Total
Number of Subjects	N=1	N=3	N=5	N=4	N=4	N=17
Ethnic Background						
Caucasian	1	0	3	2	2	8
Native American	0	3	2	2	2	9
Gender						
Male	0	3	2	3	2	10
Female	1	0	3	1	2	7
Socioeconomic Status						
Above Poverty Level	0	1	1	0	1	3
Below Poverty Level	1	2	4	4	3	14
Preschool Experience						
A Preschool Experience	0	1	0	0	0	1
No Preschool Experience	1	2	5	4	4	16

Absolute and Difference Scores for Analysis of Variance Date.

In like manner, the author is presenting the absolute and different scores of the three independent variables for each individual student. Tables 15, 16, 17, and Table 18 present the individual subject break-out by independent variable.

Time Factor for Delivery of Services for Experimental Groups.

Table 19 represents the actual time factor for the delivery of services to each of the independent groups listed by building sites and number of subjects/students.

Correlational Matrix Design.

The second series of tests related to correlational studies of absolute scores covering the period from Spring 1981 to 1982. Table 20 presents the correlational methodology for both absolute and difference reading achievement gain scores.

Table 15

ABSOLUTE AND DIFFERENCE NCE'S SCORES BY SUBJECT AND DATES OF TEST FOR GROUP 3 (N = 8)

Intervention	Student I.D. Number	ABSOLUTE Pretest Spring'81	ABSOLUTE Mid-point January'82	ABSOLUTE Posttest June'82	DIFFERENCE Semester One	DIFFERENCE Semester Two	DIFFERENCE Annual Gain
Regular Title I Intervention 1st semester/ Special Intervention Alone 2nd Semester	17	42	54	68	12	14	26
	18	38	54	50	16	-4	12
	19	52	53	50	1	-3	-2
	20	45	68	77	23	9	32
	21	47	51	69	4	18	22
GROUP 3 Title I/Phoenix	22	28	24	44	-4	20	16
	23	44	46	56	2	10	12
	24	41	49	71	8	22	30
Mean		42.13	49.88	60.63	7.75	10.75	18.50

Table 16

ABSOLUTE AND DIFFERENCE NCE'S SCORES BY SUBJECT AND DATES OF TEST FOR GROUP 2 (N = 8)

Intervention	Student I.D. Number	ABSOLUTE Pretest Spring '81	ABSOLUTE Mid-point January '82	ABSOLUTE Posttest June '82	DIFFERENCE Semester One	DIFFERENCE Semester Two Gain	DIFFERENCE Annual
Special Intervention 1st Sem./ Special Intervention Plus Regular Title I 2nd Semester	9	46	50	64	4	14	18
	10	41	68	68	27	0	27
	11	38	71	59	33	-12	21
	12	48	60	50	12	-10	2
	13	34	41	66	7	25	32
	14	36	55	45	19	-10	9
Group 2 Phoenix/Phoenix Plus Title I	15	28	47	44	19	- 3	16
	16	23	31	45	8	14	22
Mean		36.75	52.88	55.13	16.13	2.25	18.38

Table 17
ABSOLUTE AND DIFFERENCE NCE'S SCORES BY
SUBJECT AND DATES OF TEST
SPECIAL INTERVENTION PLUS REGULAR TITLE I BOTH SEMESTERS
(N = 1)

Type of Intervention	Student I.D. Number	ABSOLUTE Pretest Spring '81	ABSOLUTE Mid-point January '82	ABSOLUTE Posttest June '82	DIFFERENCE Pretest Spring '81	DIFFERENCE Mid-point January '82	DIFFERENCE Posttest June '82
Special Intervention Plus Regular Title I Both Semesters	8*	29	38	44	9	6	15
Mean		29	38	44	9	6	15

*Subject not included in ANOVA;but is included in correlations.

Table 18

ABSOLUTE AND DIFFERENCE NCE'S SCORES BY
SUBJECT AND DATES OF TEST FOR GROUP I--SPECIAL INTERVENTION PHOENIX ALONE ALL YEAR
(N = 7)

Type of Intervention	Student I.D. Number	ABSOLUTE Pretest Spring '81	ABSOLUTE Mid-point January '82	ABSOLUTE Posttest June '82	DIFFERENCE Semester One	DIFFERENCE Semester Two	DIFFERENCE Annual Gain
Special Intervention Alone All Year	1	58	73	71	15	-3	12
	2	49	49	73	12	16	28
	3	48	60	76	12	16	28
	4	29	41	35	12	-6	6
Group I Phoenix	5	34	54	64	20	10	30
	6	32	29	58	-3	29	26
	7	61	61	80	0	19	19
Mean		44.43	52.43	65.29	9.71	11.57	21.29

Table 19

TIME FACTOR FOR DELIVERY OF
SERVICES FOR EXPERIMENTAL GROUPS

		First Semester			Second Semester		
Building/ Site	Number of Subjects	Title I Alone	Title I + Phoenix	Phoenix Alone	Title I Alone	Title I + Phoenix	Phoenix Alone
Bruce	1*						1
Finlayson	3			3			3
Jefferson	5			5			5
Lincoln	6			6		6	
McKinley	4	4					4
Soo	6			6		6	
Washington	4	4					4
TOTAL	29	8	0	20	0	12	17

*Bruce Township School Student/Subject serviced only second semester

Table 20

ABSOLUTE AND DIFFERENCE CORRELATIONS

	Spring '81 Pretest	January '82 Mid-point	June '82 Posttest
Pretest Spring '81			
Mid-point January '82			
Posttest June '82			

Spring--Spring to January 1982 (Semester 1)
January--January 1982 to June 1982 (Semester 2)
June--Spring 1981 to June 1982 (Year)

III. RESULTS

Semester One Evaluation

Table 21 presents the one-way analysis of variance data for the difference scores for semester one. As previously described, the three levels of the independent variable, type of treatment intervention, are: Group 1--Phoenix, Group 2--Phoenix, and Group 3--Title I. As described in the discussion section, the dependent measure, the difference score, represent the difference between an individual student's pre-test score in the Spring of 1981 and the mid-year score for January of 1982. A one-way analysis of variance performed on these data yielded an F of 1.805 (df = 2, 20). No significant differences were found between the difference scores earned by the subjects in the three treatment groups for semester one.

Given that the one way analysis of variance using difference scores across the first semester was nonsignificant, the author chose to collapse the three groups into two groups. For semester one, the two Phoenix groups, together constituting fifteen students, were collapsed into one group. A second group of eight students represented the Title I intervention. Using the difference scores as the dependent measure, a t-test for independent groups was performed. As presented in Table 22, the t-test analysis (t=1.361, df = 21) was non-significant. For semester one, the Phoenix intervention did not differ significantly from the Title I intervention, as measured by difference scores.

Semester Two Evaluation

As presented in Table 23, a one-way analysis of variance for unequal N's was performed using difference scores as the dependent measure for semester two. In this case the three levels of the

Table 21

ONE-WAY ANALYSIS OF VARIANCE FOR UNEQUAL N'S
FOR READING NCE'S DIFFERENCE SCORES FOR SEMESTER I
(N = 23 Subjects)

Source	N	Mean	SS	df	MS	Degree of Significance
1	7	9.71	304.6	2	152.32	ns
2	8	16.13	1687.8	20	84.39	ns
3	8	7.75	1992.4	22	90.57	ns

1 = Phoenix

2 = Phoenix

2 = Regular Title I

Table 22

T-TEST FOR INDEPENDENT GROUPS USING THE DIFFERENCE NCE SCORES AS THE DEPENDENT MEASURE FOR SEMESTER 1 (N = 23 Subjects)

Source	N	Mean
1	15	13.33
2	8	7.75

T (21) = 1.361

1 = Phoenix

2 = Regular Title I

Table 23

ONE-WAY ANALYSIS OF VARIANCE FOR UNEQUAL
N'S FOR READING NCE'S DIFFERENCE SCORES FOR SEMESTER 2

(N = 23 Subjects)

Source	N	Mean	SS	df	MS	Degree of Significance
1	7	11.71	421.40	2	210.70	ns
2	8	2.25	2908.43	20	145.42	ns
3	8	10.75	3329.83	22	151.36	ns

1 = Phoenix

2 = Phoenix

2 = Regular Title I

independent variable were: Group 1--Phoenix alone, Group 2--Phoenix plus Title I intervention, and group 3--Phoenix alone. The analysis of variance using the difference score as the dependent measure with 2, 22 degrees of freedom, revealed an F of 1.449 and was non-significant. For the second semester intervention, no significant differences existed among the three intervention groups.

Given the non-significant one-way analysis of variance for the dependent measure of difference scores for semester two, the author chose to collapse the two Phoenix groups and to contrast their performance with the performance of the Phoenix plus Title I intervention group. A t-test for independent groups was performed on the dependent measure of difference scores. With 21 degrees of freedom a t of 1.737 was obtained. The t-test for the difference scores for the second semester revealed a significant difference ($P<.05$) between the Phoenix treatment alone versus the Phoenix plus Title I intervention. An inspection of Table 24 reveals that the difference score mean for the collapsed Group 1--Phoenix intervention alone was 11.2 while the difference score mean for the Phoenix plus Title I intervention was 2.25. Students who received the Phoenix intervention alone during semester two did significantly better in their growth than did students who received both the Phoenix intervention and the Title I intervention.

Across Semester Comparisons

Figure 3 presents the data from the three groups for semester one and semester two. As can be seen from an inspection of Figure 3, the performance of the original three groups during semester one was contrasted with the performance of the reconstituted groups in semester two

Table 24

T-TEST FOR INDEPENDENT GROUPS USING THE DIFFERENCE NCE SCORES AS THE DEPENDENT MEASURE FOR SEMESTER 2 (N = 23 Subjects)

Source	N	Mean
1	15	11.2
2	8	2.25

t (21) = 1.736

1 = Phoenix

2 = Title I plus Phoenix

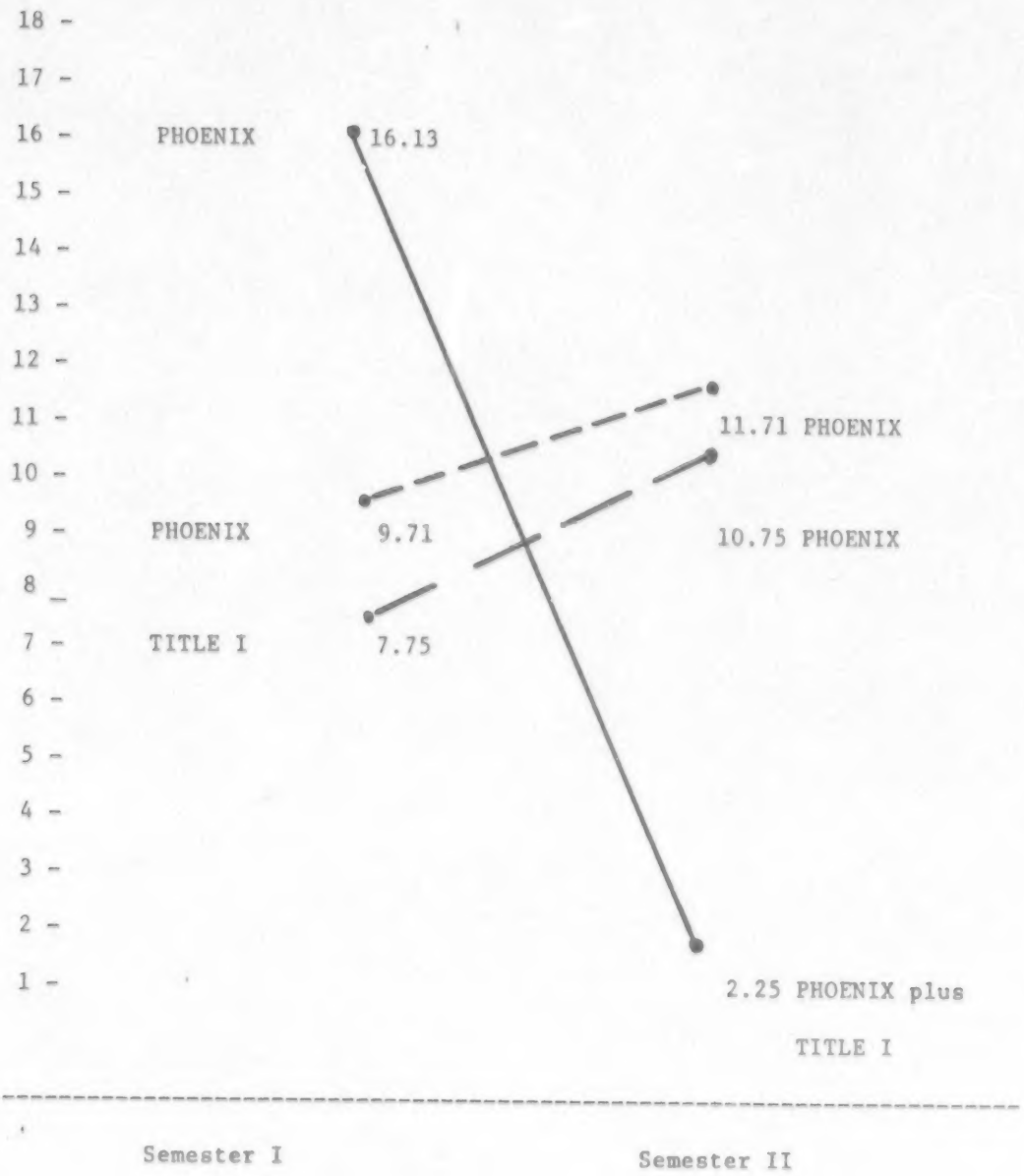
These difference score data reveal that during semester one, from the time of the pre-test to the mid-year evaluation, one of the two groups who received the Phoenix treatment was although not significantly, at least visually higher than the other two groups. Further, although not significantly different, the groups were arranged at the end of semester one in the following order: Phoenix Group 2, Phoenix Group 1, and Title I intervention. In contrast, the difference scores for the second semester as evaluated from January 1982 to June 1982, based upon difference scores, indicated a change of relationship among the three re-constituted groups. Based on semester two difference score data the students in the Phoenix Group which had remained constant across both semesters achieved the highest difference score, followed by the students who received Title I intervention during semester one and then Phoenix intervention during semester two, followed by students who received the Phoenix intervention for semester one, and then both Phoenix and Title I interventions during semester two.

Because the type of treatment received for each semester was confounded with the type of treatment received during the previous semester, it was inappropriate to perform a two-way analysis of variance in which type of treatment intervention served as one independent variable and semester of treatment intervention served as the second independent variable. Consequently, it is difficult to interpret the meaning of the difference scores across two semesters as the second semester treatment intervention, no matter which type it happened to be, is confounded with what did or did not happen during semester one.

Given the fact that not all treatment combinations were present in the experimental design across both academic semesters, a two-way analysis of variance was inappropriate.

Figure 3

NCE DIFFERENCE SCORES



Notes: 1) Over the year, no group was significantly better than the others in NCE difference scores.

2) No difference between groups for June 1982 scores.

IV. INTERPRETATIONS OF RESULTS

Based on the difference data for one academic year as expressed in this pilot study project it is impossible to confirm or reject the original hypothesis in its initial form. Perhaps what has been accomplished is the development of additional sophisticated hypotheses as a consequence of the initial formative design. Among the questions that come to mind are the following:

-- Is it possible that the Phoenix intervention has its greatest impact during the first semester such that a ceiling effect is reached and no further substantial improvement may be expected through the duration of the academic year?

-- Is it possible that the Phoenix intervention, if continued by itself for an entire academic year, will prove to be more fruitful then combining the Phoenix intervention with an on-going Title I intervention at the time of the second semester?

-- Is it possible that introducing the Phoenix intervention following the traditional Title I treatment impacts significantly upon the students whenever the Phoenix intervention is substituted for the Title I program?

-- Is it possible that students experience an over-load when two interventions, no matter what their independent merits be when employed singularly, are introduced?

The present data for the difference scores for the second semester indicate that a single intervention is perhaps more potent then a dual intervention, although the type of intervention and the power of a

particular singular intervention during semester two cannot be ascertained.

Formative designs are used in educational settings to provide data for educational decision-making. The present data, confounded though they are, provided a set of potential hypotheses for programming the 1982-1983 academic year. The present author, in consultation with his compensatory education staff, chose to continue his formative evaluation method during the current 1982-1983 academic year for a new group of transition students.

Initial planning required the compensatory education director and his staff to identify the eligible transition students. Twenty-nine students in four buildings were identified. As compared to the previous year, the utilization of four eligible buildings represents a decrease of three buildings due to: (1) an elementary building being closed, (2) an elementary building being determined not eligible to receive Chapter I fundings, and (3) an elementary building having no transition students.

Once the transition students were identified, a formative design was developed which could be managed within the constraints of limited student numbers. Discussion with the staff revealed two critical variables. The first, type of intervention, was composed of two levels. Phoenix intervention alone constituted the first level of the independent variable, and Phoenix intervention plus Title I constituted the second level of the independent variable. The second independent variable to be identified was format of intervention delivery. Two levels were identified: (1) a massed delivery of intervention and (2) a distributed format of the delivery of intervention. In each of the two

levels of the format of intervention delivery students received 4.5 hours of intervention per week. In massed condition, the transition students receive 4.5 hours of intervention on three occasions. Each occasion consume 1.5 hours. For the distributive condition each transition student receives 4.5 hours of intervention per week but five times a week for 55 minutes at a session.

Table 25 presents the design for semester one for the 1982-83 academic year. As in the previous design, the students were assessed the spring of 1982 for their pre-test scores and are receiving their mid-year evaluation during the week of January 23, 1983. Following the mid-year or interim testing evaluation, the compensatory education director and his staff and consultants will determine the feasibility of (1) collapsing groups based on non-significant differences between levels of a variable, (2) changing the format or the structure of the intervention for the second academic semester, or (3) instituting other revisions in the curriculum and/or the delivery of the intervention.

The strength of the formative evaluation design as a tool for educators is that it provides a means for assessing a program while it is in progress by creating a means for evaluating interim data and a methodology for changing the delivery system prior either (a) to the termination of the program or (b) the full-year exposure of students to a particular variety of program delivery. Unfortunately too few educators have developed an appreciation for the decision-making powers of the formative evaluation model.

In the area of transition low-reading readiness education much yet is unknown. Current literature has but hints to offer at the present

time for the construction and delivery of educational systems for these special primary school students. Our current program in Sault Ste. Marie is in many senses a set of stepping stones, not only for the students which we serve but for the educators who strive to serve them more expertly. The task of the educational administrator is to utilize the research evidence which currently exists to provide a basis for program development and to employ those research tools which best serve the educational administrator to assess the strength of the delivery systems which are currently being offered. It is the author's belief that the formative or process evaluation design provides a mechanism by which one may blend the skills of the researcher with the needs of the service provider to both develop and assess enrichment opportunities for students and to evaluate student outcomes against those provided by alternative strategies for the delivery of services.

Table 25

STEPPING STONES FORMATIVE DESIGN FOR FIRST SEMESTER 1982-1983 (N = subjects/students)

Level	Time	Frequency per Week
1. Phoenix (massed)	4.5 hrs/week	75 minutes for 3 sessions
2. Phoenix (distributed)	4.5 hrs/week	55 minutes for 5 sessions
3. Phoenix plus Title I (massed)	4.5 hrs/week	75 minutes for 3 sessions
4. Phoenix plus Title I (distributed)	4.5 hrs/week	55 minutes for 5 sessions

One building for each level

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